OTITIS MEDIA AS AN ÆTIOLOGICAL FACTOR IN GASTRO-ENTERITIS*

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The idea that otitis media is a possible factor in the ætiology of acute gastro-enteritis is by no means of recent date. Ever since the sixties of last century this is a view which has been stressed periodically, and, although not generally accepted, it has received support particularly of otologists and morbid anatomists.

One of the most remarkable features in the pathology of children's diseases is the absence of any naked-eye or microscopic lesion in the alimentary tract of children dying of severe gastro-enteritis. It is the case of pneumonia, pyelo-nephritis or marasmus with a terminal or passing diarrhœa which presents an abnormality of the gut. Frequently, however, although in my opinion not so often as is generally stated, pus is found in one or both ears. Occasionally a suppurative nephritis may be detected but the most common post-mortem finding is broncho-pneumonia. From the localization and histological characters it is possible to express an opinion regarding the age and type of the pneumonia, but unfortunately this is not so in the case of otitis. So far as I am aware, one cannot decide from the morbid anatomy the duration of the inflammation of the middle ear, and thus whether it was, or was not, in existence prior to the onset of the gastro-enteric symptoms. This of course is the crux of the matter. No doubt the adherents of the hypothesis that otitis media is the cause of gastro-enteritis are influenced by the doctrine of focal sepsis, which has been a favourite explanation of any disease of still undecided ætiology, as pernicious anæmia and rheumatoid arthritis amply testify.

In contrast to otologists and morbid anatomists, pædiatricians for the most part have been sceptical that in focal sepsis, of which otitis media is only one example, is to be found a serious cause of gastro-enteritis, and for this scepticism there are several good reasons. In the first place, it must be remembered that of all the functions during infancy nutrition is the most important. At no other period of life is growth so rapid. Digestion and

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absorption are working, as it were, at concert pitch and in consequence are easily upset. But whatever the explanation, there is no doubt that in the symptomatology of disease during infancy the most constant features are those of interference with nutrition and gastro-intestinal disturbance. Those of us who have the care of infants appreciate that illness during this age-period is more frequently reflected in the weight curve than in that of the temperature. We also know that whether the illness be one of the gastro-intestinal tract, or one of some organ far removed, vomiting is the most common early symptom. Vomiting in infancy takes the place of a shivering or rigor in the adult. And further, instead of constipation, which is the rule in any febrile illness in the adult, diarrhœa, or at least a looseness of the motions, is in similar circumstances not unusual. To this rule acute otitis media is no exception.

It is because of this peculiarity of infancy that it is unfortunately a common error to diagnose in the very young all sorts of conditions, e.g., broncho-pneumonia, pyelo-nephritis, poliomyelitis, meningitis, etc., as gastro-enteric in nature. Indeed, this fact has taught pædiatricians never to make a diagnosis of gastro-intestinal mischief until a complete physical examination (not omitting the ears) has failed to reveal any other cause of the symptoms. It may be remarked, however, that although the gastro-intestinal symptoms may dominate the clinical picture, when these are secondary to some non-alimentary disease, they are never of the severity of true gastro-enteritis, nor are they usually accompanied by the coma, dehydration and Hippocratic facies so characteristic of that condition.

In this connexion it is interesting to contrast the incidence and nature of the gastro-intestinal symptoms in those examples of pneumococcal meningitis in which disease of the ear is probably the ætiological factor, with those in which otitis plays no part, i.e., cases with and cases without otitis media. Of 18 cases of pneumococcal meningitis with otitis media in children under one year of age, seven suffered from severe vomiting, and diarrhœa was a marked feature in five of the children. In only one case, however, was there any dehydration and an appearance such as is characteristic of true gastro-enteritis. This child had been ill for one month and presented, in addition, pyuria and broncho-pneumonia. On the other hand, of 18 infants suffering from pneumococcal meningitis without otitis media, as verified at post-mortem examination, severe vomiting was present in eight of the cases and diarrhœa in five, i.e., in practically the same proportion.

Comparison of gastro-enteritis and otitis media

Social incidence.—As previously mentioned the cause of gastro-enteritis is still uncertain. It may be that there are several causes but, whatever the nature of the ætiological factor, there are certain features in the life history of the disease which make it unlikely that otitis media plays an important rôle in this direction. One of the most striking is that gastro-enteritis is a disease which is almost entirely limited to the hospital classes. Although one

constantly meets it in the out-patient departments and wards of the hospital, I have only records of having seen in private practice 12 cases during the 10 years 1920 to 1929 inclusive. On the other hand, during this same period, I have seen in private practice 32 infants with uncomplicated otitis media.

Past feeding.—Equally striking with the social incidence of gastro-enteritis is its almost exclusive occurrence in the bottle-fed child. Of 320 infants admitted to hospital with gastro-enteritis during the course of six years, in whom I have definite information regarding the nature of the feeding at the time of the onset of the illness, only 9 per cent. were breast-fed. I have no comparable figures in connexion with uncomplicated otitis media, although I should be astonished to learn that it would present the same predilection for the bottle-fed child. I have, however, details regarding the nature of the feeding in 18 hospital infants admitted with pneumococcal meningitis and pneumococcal otitis media, and of these 44 per cent. were breast-fed. If it is permissible to take this incidence of otitis media as a measure of that prevailing in the breast-fed child generally, then it would appear that, if this septic focus has anything to do with gastro-enteritis, it is practically only in the bottle-fed child that it exerts its pernicious effect, a conclusion which is most assuredly untenable.

Seasonal incidence.—Another characteristic feature of gastro-enteritis is its special prevalence during the warmer months of the year, e.g., July, August and September, and especially is this the case when the disease assumes epidemic proportions. For example in 1921, when there occurred the last real epidemic in the west of Scotland, and for that matter in Britain, 64 per cent. of the cases admitted to the Royal Hospital for Sick Children, Glasgow, came under observation during that trimester; whereas in the year 1928, when the disease was not unusually prevalent, only 44 per cent. of the examples occurred during this period of the year. One would expect, on the other hand, that otitis media would be most prevalent during the colder months of the year and this at least has been my experience. I have no records of the seasonal incidence of otitis media in hospital cases but I have details regarding the examples seen in private practice and these show that only 12·5 per cent. occurred during these three months, while 50 per cent. occurred during the winter and spring. It may also be mentioned that of the examples of pneumococcal meningitis with otitis only 20 per cent. came under observation during the months of July, August, and September. It may be argued, of course, that I am referring to a type of gastro-enteritis which is a specific infection, and a disease sui generis and not the variety caused by otitis media. To this I reply that it was during the epidemic in the summer of 1921 that Renaud[1] in Paris studied the disease, formulated his conclusions regarding the rôle of otitis media, and suggested mastoidectomy as the proper line of treatment.

Myringotomy in gastro-enteritis.—My introduction to this question was by that master clinician Finkelstein[5], who was very emphatic that otitis media was not the cause of gastro-enteritis and advised against interfering

with the ear unless local symptoms demanded it. This was my own practice for many years. However, in view of the continued ignorance of the true cause of this disease, and the reports from France[1] and America[2, 3] of good results from attacking the ear, I was tempted some years ago to test this line of treatment for myself. At first I contented myself by incising the drum in all cases in which pus was suspected. The results were quite inconclusive. Seldom did we see any immediate response, especially when enteritis was a marked feature, and the course of the disease did not appear to be materially affected. Indeed, at times we got the impression that we had done harm by our interference. Quite otherwise was it when myringotomy was performed in a case uncomplicated by gastro-enteritis. But in order to make a better test it was decided that in one ward all ears should be treated while in another ward the ears should be left alone. Still we could not see any definite effect in response to this line of therapy.

Mastoidectomy in gastro-enteritis.—If, however, as is frequently stated, the inflammation in the middle ear invariably extends to the mastoid antrum no great benefit can be expected from simple myringotomy, since by this operation only a part of the focus is attacked. But this extension of the disease to the mastoid antrum is in the vast majority of cases pure assumption. In my experience pus in the middle ear does not necessarily mean pus in the antrum. This is a point of considerable importance in our evaluation of the otitic hypothesis of the cause and of the therapy of gastro-enteritis recommended by certain French and American schools. In a consecutive series of 15 post-mortem examinations on infants with otitis media under my own care, pus was present in one or both antra only in four, i.e., 26 per cent.

Since, however, it is impossible on clinical grounds to eliminate extension to the mastoid antrum, and being influenced by the teachings of the French and Americans, I had, during the autumn of 1928, nine cases submitted to double antrotomy. Seven died and two recovered. A review of the cases shows that the two which recovered were not seriously ill. In neither was there any great depletion, nor was the weight falling, so that it is possible that they would have recovered had they been left alone. I suggest this because the most valuable prognostic features in gastro-enteritis are the apparent severity of the illness and the degree of dehydration which the child presents on coming under observation. For example, of 43 children noted as being very ill on admission to hospital 50 per cent. died, whereas of 38 described as not very ill only 5 per cent. succumbed.

In the case of the seven children who died five were considered on admission as not very ill. Nor was the operation of mastoidectomy performed as a last resort. In two instances both antra were opened within 24 hours of admission to hospital and in another case within four days. It is also interesting to record that in one of the cases which came to post-mortem examination, the pathologist stated that the pus was confined to the middle ear and that the antra presented no sign of inflammation, although the

surgeon was convinced that pus was evacuated at the time of the mastoidectomy. No one, I feel sure, could consider these results encouraging; at any rate they induced me to abandon this line of treatment.

A study of the French and American literature dealing with this line of therapy, on which be it remembered the hypothesis of ætiology is based, can, I feel sure, also engender nothing but scepticism. Renaud in 1921, which was as I have already mentioned an epidemic year, claimed that otitis media was the cause of gastro-enteritis and reported that he performed paracentesis in 36 cases with a recovery rate of 38 per cent. and in 10 mastoidectomy with a recovery rate of only 10 per cent. It was in 1925 that the Americans[2] first stated that myringotomy favourably influenced this disease. In 1927, however, we find the same authors[3] recommending that, if the results which they had previously claimed for myringotomy were to be got, mastoidectomy must be performed. Still later they assert that if mastoidectomy is to be successful the operation must be performed under a local and not a general anæsthetic. But surely the climax was reached in 1928 when we find Odeneal[4] writing that, if the child does not improve with mastoidectomy, the nasal accessory sinuses, which he states are infected in 50 per cent. of cases, should be opened and drained.

Causes of nutritional disease in infancy.

Nutritional disease in infancy can be divided into two main groups—the toxic and the non-toxic. In both there is failure to gain in weight, or actual loss of weight, but in the one group (gastro-enteritis or intoxication) there is evidence of gastro-intestinal irritation (diarrhœa) and toxic symptoms, whereas in the other (marasmus or athrepsia) these toxic and irritative manifestations are conspicuous by their absence. It is important to bear in mind that the one type may lead to and pass into the other, and that both varieties render the child susceptible to all sorts of septic and microbic infections. In this way the clinical picture of nutritional disease becomes most complex, and the discrimination between cause and effect one of the most difficult problems in clinical medicine. We have learned that a large proportion of the non-toxic cases result from underfeeding, although chronic disease of various kinds may interfere with nutrition and reproduce an identical picture. The cause of the toxic variety is, however, still undecided. It certainly has not been demonstrated that focal sepsis, and especially otitis media, is a serious responsible factor. Otitis media, just as pyelonephritis and broncho-pneumonia, frequently develops during the course of the nutritional diseases and no doubt increases the gravity of the case, but our chief aim is to cure the primary condition which is rendering the child less resistant. It must also be appreciated that a child the subject of otitis media, and especially if being artificially fed, may contract gastro-enteritis. It may even be assumed that in consequence of the otitis the child has been rendered more liable to gastro-enteritis. Nevertheless, the gastro-enteric infection is the major problem and demands first consideration.

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